



**TCEQ DAM SAFETY**  
Field Operations Support Division

Dam Evaluation Report

**Hearn Dam**

**TX09407**

**GENERAL INFORMATION**

INVENTORY No.: TX09407

WATER RIGHT AUTHORIZATION: 5583

OWNER: Three Rivers Council Boy Scouts of America

STREAM: Magnus Branch

BASIN: Neches River

COUNTY: Tyler

GENERAL LOCATION: 2.8 miles SW of Woodville

DAM HEIGHT: 17 ft

DOWNSTREAM HAZARD RATING:

NORMAL CAPACITY: 28 ac.ft

MAXIMUM CAPACITY: 68 ac.ft

NORMAL WATER LEVEL: 267 ft msl

CURRENT WATER LEVEL: 267 ft msl

PREVIOUS INSPECTION DATE: November 12, 2001

CURRENT INSPECTION DATE: September 29, 2009

INSPECTION BY TCEQ PERSONNEL: C.W. Schneider, Jay Carsten and John Thomen

PERSONNEL CONTACTED: Les Bentley, Rodney Foxworth

**SUMMARY**

Hearn Dam, a small, dam in Tyler County, was inspected by Texas Commission on Environmental Quality Dam Safety staff as part of the agency's regular inspection schedule. The dam was found in fair condition overall. Compared to the last inspection report, an area of erosion was again seen in the same general area of the upper end of the emergency spillway. The concrete spillway had what appeared to be extensive erosion beneath its lower end. Most of the other items noted were related to maintenance.

**BACKGROUND**

Hearn Dam was last inspected in November 2001. At that time, the dam was reported to be in fair condition overall. The earthen surfaces needed better grass coverage, and the upper end of the emergency spillway had an area of erosion with the maximum depth of approximately nine inches. At that time, the concrete spillway appeared to be in good condition except for some

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water flowing from under the concrete at the right side of the spillway. At that time, it appeared that soil along the right side of the spillway had eroded it a depth of 12 to 18 inches.

## **CURRENT EVALUATION**

Figure 1 shows a general location and the topography for the area around Hearn Dam. Figure 2 shows a diagram of the dam with locations of the attached photos.

### ***Upstream Slope of Embankment***

- The upstream slope had tall, dense vegetation – weeds, brush, a few small trees - growing on the slope. See Photo 1.
- In the locations where the upstream slope was more thoroughly investigated, the slope was even and no deficiencies were noted in the embankment itself.
- Several animal trails, possibly beaver ‘slides,’ were observed running down the slope, but no other obvious beaver activity was observed. The trail with the most damage to the embankment is shown in Photo 2.

### ***Crest of Embankment***

- The crest appeared to be level right to left with a crowned appearance upstream to downstream.
- The crest had a sparse grass cover. See Photo 3.
- The crest was measured with a survey rod at one location to be about 11 feet wide.
- The crest was paced off at one location to be 16 feet wide.
- The crest was paced off to be approximately 210 feet long.
- The crest was of a sandy material.
- Fire ants were noted.
- Evidence of vehicle traffic on the crest was noted.

### ***Downstream Slope of Embankment***

- The downstream slope had a short, recently mowed grass cover. Coverage was fair with a few bare spots. See Photos 4.
- The approximate slope was between 2.5:1 and 3:1.

### ***Service Spillway***

- The service spillway consisted of a 12-inch steel pipe through the embankment with valving that allows three different water levels.
- The outlet pipe structure was in good condition. It was reported that both valves are regularly exercised.
- Heavy brush was growing on the west side and just upstream of the outlet pipe structure. See Photo 5. Possible animal activity was observed in this brush in the area just up-slope from the outlet pipe structure.

### ***Emergency Spillway***

- The earthen emergency spillway at the left end of the dam was not engaged.
- The elevation of the emergency spillway was 2.7 feet above the water surface elevation.

- Photo 6 shows that the typical low brush seen at the water line along the upstream slope continues across the upstream edge of the emergency spillway.
- The earthen emergency spillway had a bare spot at the crest. See Photo 6.
- The erosion shown in Photo 7 was just downstream from the crest. This eroded surface was in approximately the same location as the erosion reported in the 2001 inspection. Based on available photographs, the current erosion is estimated to have less aerial extent than that observed at the 2001 inspection. The erosion shown in the 2001 inspection report did not appear to have as pronounced of a headwall as the erosion observed at this inspection. It is estimated the maximum height of the headwall was approximately 18 inches.

### ***Concrete Spillway***

- The concrete spillway at the right end of the dam was minimally engaged. See Photo 8.
- The bottom width of the concrete spillway was paced off at 14 feet.
- Grass was growing out of construction joints in the upper and lower sections of this spillway. These construction joints appeared to be open and appeared to be allowing water to flow into the area beneath the concrete. See Photo 9.
- Photo 10 shows the area to the right of the lower end of the concrete.
- What appeared to be a rather extensive void was found beneath the concrete of the lower section of the concrete spillway. Photos 11 shows what appears to be the reinforcing rod exposed at the bottom of the concrete slab. And in another nearby location, Photo 12 shows another void or perhaps the same void approximately 25 feet further upstream from the location of Photo 11.
- The right side and downstream end of the channel were badly eroded. Concrete rubble had been dumped in the eroded area, but appeared to be ineffective.

### ***Downstream Channel***

- Hearn Dam discharges directly into the upper reach of Barclay Lake.

## **OPERATION AND MAINTENANCE (O&M) PLAN**

The owner indicated that there is no operation and maintenance plan for the dam.

## EMERGENCY ACTION PLAN (EAP)

The TCEQ Dam Safety Program has no record of an Emergency Action Plan (EAP) for this dam.

## RECOMMENDATIONS

1. The TCEQ Dam Safety Rules (30 TAC §299.61) require that an Emergency Action Plan (EAP) be developed for this dam. Such a plan would be used to warn affected downstream residences in the event of an unplanned release of water from the reservoir. Guidance on items to be included in an EAP can be found in the Dam Safety's *Guidelines for Developing Emergency Action Plans for Dams in Texas (GI-394)*. Such a plan must be provided to the TCEQ Dam Safety office for review by January 1, 2011 to meet the requirements of 30 TAC §299.61.
2. It is strongly recommended that the voids under the concrete spillway be immediately addressed. A professional engineer should be consulted for feasible solutions to this condition. Support for the concrete will eventually not be enough, and the spillway will collapse. This repair will be more effective if proper spillway sizing is taken into account by your engineer (see Rec. #10).
3. Debris, brush, and trees (less than 4" diameter) should be removed from the entire embankment, including the crest, upstream, and downstream slopes, and from the downstream toe. Trees larger than 4" diameter, if any, may remain until their death, at which time the tree and roots should be removed and resulting hole(s) backfilled with properly compacted clay. Removal of larger trees and backfill repairs should be supervised by a professional engineer with dam experience. All brush and woody vegetation should also be removed from the service and emergency spillways. After tree removal and hole repair, a proper grass cover should be reestablished.
4. As part the spillway repair, joints should be cleared of vegetation and grout replaced.
5. Once the upstream slope is clear of woody vegetation, the slope should be inspected by a Professional Engineer to determine if slides and/or benching are occurring. Proper repairs to these problems should be developed and implemented under the supervision of a Professional Engineer.
6. Water flowing down the relatively flat concrete spillway and the hill to the right of this spillway has caused erosion to the right of the concrete spillway. The owner may wish to consult a professional engineer for a feasible solution to this condition.
7. Concrete pipes and debris in the channel downstream of the primary spillway are blocking the channel. They should be removed and replaced with properly sized material to serve as erosion protection. The material currently in place is not effective.
8. Erosion in the emergency spillway should be repaired, because it may progress back to the reservoir with each engagement, eventually leading to loss of the reservoir if left uncorrected. Excessive velocities in the spillways can be corrected through proper spillway sizing for the required design storm (see Rec. 10)
9. An operation and maintenance plan is required for all dams (30 Texas Administrative Code, §299.43). The plan should include maintenance for all grassy surfaces on the embankment and the area within ten to fifteen feet of the toe. Maintaining a 6-inch grass cover provides an ideal surface to protect against erosion, to limit suitable habitat for burrowing animals, and also to allow for easier detection of developing problems. Irrigation may be necessary to maintain this grass cover. The plan should include clearing vegetation and debris from the lake's water line, from the spillways, and from around the outlet pipe structure. The plan should include annual operations of all mechanical equipment. If mechanical equipment has

not been operated in several years, extreme care should be taken, and it is recommended that a knowledgeable person or company be consulted before any attempt at operation. The plan should include at least annual inspection of all metal surfaces and the making necessary repairs and painting.

10. The owner may wish to have a revised hydrologic and hydraulic analysis performed by a Texas licensed professional engineer for this structure to show safe passage of the required project flood ( \_\_\_\_ of the Probable Maximum Flood). Depending on the results of the analysis, additional spillway capacity may need to be designed and installed into the structure. Any such dam modification plans must be submitted to the TCEQ's Dam Safety Program for review and approval prior to the beginning of any work.

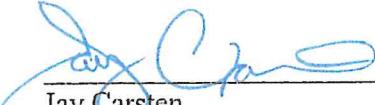
## CONCLUSIONS

The owner should address the recommendations made in this report as soon as possible and develop a regular maintenance and repair program. It should be noted that it is the owner's responsibility to maintain the dam in a safe condition in order to prevent loss of life and limit the potential for property loss. In doing so, the owner will reduce liability exposure and, with regular maintenance, will minimize costs.



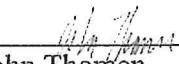
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Jay Carsten  
Dam Safety Inspector



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John Thomen  
Dam Safety Inspector



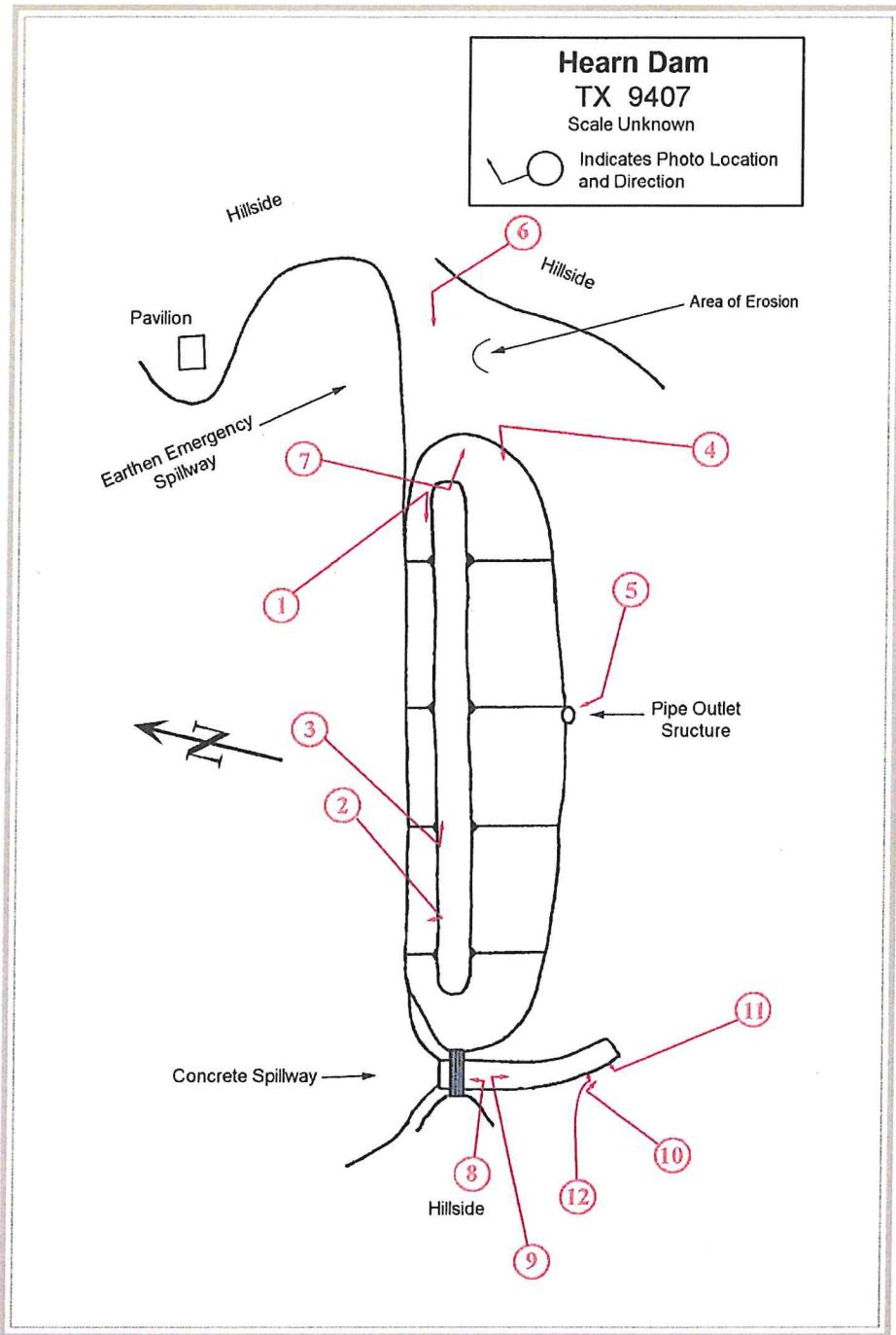
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Laura Gibson, P.E.  
Team Leader, Dam Safety Section  
Field Operations Support Division

## Hearn Dam - TX 9407



**Figure 1 - General Location Map**



**Figure 2 - Diagram of the Dam**



**Photo 1** - Upstream slope and crest.



**Photo 2** - Animal trails on the upstream slope. Several other trails were seen, but this one has by far the greatest amount of damage.



**Photo 3** - Typical condition of the crest.



**Photo 4** - Downstream slope from the left. Individuals are standing at the outlet pipe structure.



**Photo 5** - Outlet pipe structure. Both valves were reported to be operational.



**Photo 6** - Emergency spillway. The small pine trees in the upper left are at the erosion seen in Photo 9. The arrow is pointing at the outlet pipe structure.



**Photo 7** - Erosion in the emergency spillway.



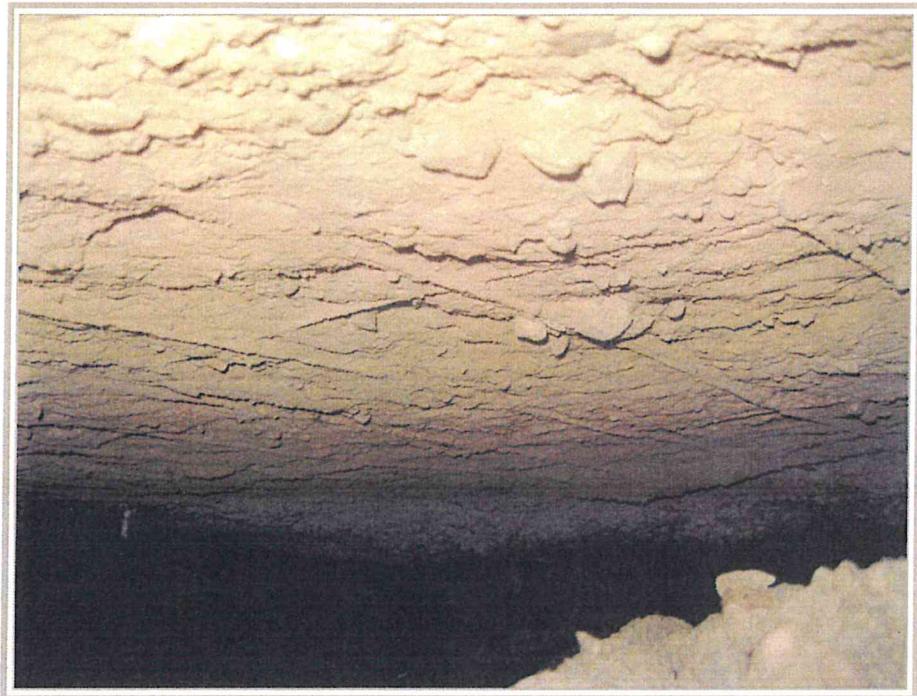
**Photo 8** - Upper end of right spillway.



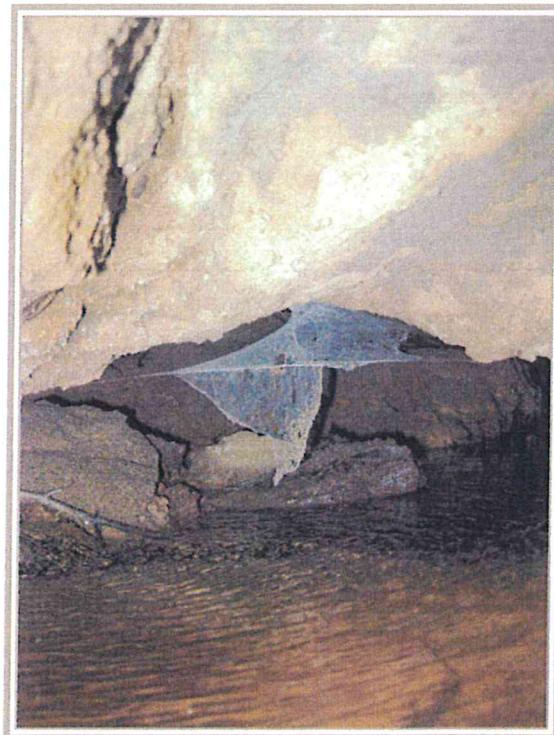
**Photo 9** - Upper section of the right spillway. At the construction joints, an abrupt change in the width of the flowing water can be seen.



**Photo 10** - Right edge of the right spillway at its lower limit. The edge of the concrete is supported in this photo, but an unsupported edge just downstream of this support revealed the void seen in Photo 11 and just upstream, an unsupported edge revealed the void seen in Photo 12.



**Photo 11** - Void beneath the concrete right spillway. Note the rectangular pattern of what looks to be exposed rebar.



**Photo 12** - Void beneath the concrete of the right spillway.